

WHAT IS CLAIMED IS:

1. A method for forming a diamond coating, at low temperature and low pressure, on a substrate, comprising the steps of:
providing a graphite rod and a high-melting metal wire and the substrate into a chamber;
filling the chamber with hydrogen;
reducing ambient pressure in the chamber below 1 atmosphere;
sealing the chamber such that the ambient pressure in the chamber remains below 1 atmosphere and the hydrogen is contained within the sealed chamber; and
applying voltage to the graphite rod until the substrate is heated within a range of 125°C-750°C.
2. The method claimed in claim 1, wherein the diamond coating manufactured is single crystalline diamond, polycrystalline diamond, noncrystalline or diamond-like in characteristics.
3. The method claimed in claim 1, wherein placement of the substrate relative to the graphite rod is determinative to the substrate having a constant temperature.
4. The method claimed in claim 2, wherein the substrate is perpendicular to the graphite rod.
5. The method claimed in claim 2, wherein the substrate is parallel to the graphite rod.
6. The method claimed in claim 2, further comprising the step of varying distance between the substrate and the graphite rod to vary the temperature of the substrate.

7. The method claimed in claim 1, wherein the diamond coating is formed on the substrate at 125°C-150°C.

8. The method claimed in claim 6, wherein the diamond coating is formed on the substrate at 125°C-150°C within 30-60 minutes.

9. An apparatus for depositing diamond coating on a substrate, comprising:

- a) a sealed chamber including graphite, hydrogen, and the substrate onto which the diamond coating is to be deposited;
- b) a high-melting metal wire, wrapped around the graphite rod, in order to promote chemical reactions needed for diamond deposition; and
- c) a means for adjusting spacing between the graphite rod and the substrate.

10. The apparatus claimed in claim 8, wherein the sealed chamber maintains inside pressure below 1 atmosphere.

11. The apparatus claimed in claim 8, wherein the temperature of the substrate is variable according to the spacing between the graphite rod and the substrate.

12. The apparatus claimed in claim 8, wherein placement of the substrate relative to the graphite rod is determinative to the substrate having the desired constant temperature.

13. The apparatus claimed in claim 8, wherein the substrate is perpendicular to the graphite rod.

14. The apparatus claimed in claim 8, wherein the substrate is parallel to the graphite rod.

15. The apparatus claimed in claim 8, wherein the diamond coating is deposited on the substrate at 125°C-150°C.

16. The apparatus claimed in claim 8, wherein the diamond coating is formed on the substrate at 125°C-150°C within 30-60 minutes.

17. The apparatus claimed in claim 8, wherein the spacing between the substrate and the graphite rod is between 1mm and 30cm.

18. The apparatus claimed in claim 8, wherein the high-melting metal wire is selected from the group consisting of platinum or nickel.

19. The apparatus claimed in claim 8, wherein the substrate is fixed in a single location during deposition.

20. The apparatus claimed in claim 8, wherein the substrate moves during diamond deposition.

21. The apparatus claimed in claim 19, wherein the diamond coating is deposited upon the substrate under a continuous flow.

22. The apparatus claimed in claim 19, wherein the substrate is a roll-to-roll material.

23. The apparatus claimed in claim 8, wherein the substrate is a flexible material.

24. Utilization of this apparatus for deposition of diamond onto a wide variety of substrates for example Semiconductors, Polymers, Metals, Glass and Quartz.